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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/689,932	10/22/2003	Joonbac Park	GCTS-0039	4014

34610 7590 07/05/2007
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Chantilly, VA 20153-1200

EXAMINER

CHEN, JUNPENG

ART UNIT	PAPER NUMBER
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2618

MAIL DATE	DELIVERY MODE
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07/05/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/689,932

Applicant(s)

PARK ET AL.

Examiner

Junpeng Chen

Art Unit

2618

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10/22/2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>05/25/04 & 05/30/04</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statements submitted on 05/25/2004 and 05/30/2006 have been considered by the Examiner and made of record in the application file.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 22-24 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Consider **claims 22 and 24**, the limitation "wherein a frequency sum of a first LO signal and the second LO signal is the same as the desired RF signal frequency from the antenna" is not supported by the specification.

Consider **claim 23**, the limitation "wherein a frequency of a first LO signal is the same as frequency of the second LO signal" is not supported by the specification.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 2 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Consider **claim 2**, Applicant fails to clearly define the relationship between the recited "front-end down-conversion mixer" and "quadrature mixer".

Claim 2 recites the limitation "the mixer" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-3, 5-8, 11, 12 and 14-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Shi et al. (U.S. Patent 7,136,431 B2).

Consider **claim 1**, Shi discloses a radio receiver comprising: a first front-end down-conversion mixer that down-converts an RF signal from a first low noise amplifier into respective intermediate frequency I and Q signals (read as LNA 102 outputs signals to mixers 104 and 106, Figure 7, line 53 of column 6).

Consider **claims 2 and 3, as applied to claim 1 above**, Shi discloses wherein a quadrature mixer performs a down-conversion of the RF signal and the mixer matches phase and gain in the I/Q signal as in claim 2, and wherein the phase and gain are matched to achieve an amount of the image rejection as in claim 3 (read as mixers 104 and 106 with 90 degree phase shift module 108, Figure 7, lines 53-54 of column 6).

Consider **claim 5, as applied to claim 1 above**, Shi discloses wherein a gain stage and a filtering stage are used to partially reject out-of-band signals and to block noise from propagating into a following stage (read as LPFs 114 and 116, and PGAs 124 and 126, Figure 7, lines 54 –57 of column 6).

Consider **claim 6, as applied to claim 1 above**, Shi discloses wherein a second down-conversion mixer converts a low IF signal into a base-band signal (read as mixing modules 142 and 144, Figure 7, line 60 of column 6).

Consider **claim 7, as applied to claim 6 above**, Shi discloses wherein the second mixer translates a static or dynamic DC offset in frequency domain, resulting in a carrier leakage and the carrier leakage is located at the same frequency of the second LO frequency (read as the mixing modules 142 and 144, working together with the DDFS 140, Figure 7, lines 60-61 of column 6).

Consider **claim 8, as applied to claim 6 above**, Shi discloses wherein a gain stage is used to block noise from being input into a following stage (read as PGAs 124 and 126, Figure 7, lines 54 –57 of column 6).

Consider **claims 11 and 12, as applied to claim 1 above**, Shi discloses wherein a plurality of local oscillator (LO) signals including at least a first LO signal and a second

LO signal are generated using a phase locked loop (PLL) circuit as in claim 11 and wherein the second LO signal is generated using a direct digital frequency synthesizer (DDFS) (read as the direct digital frequency synthesizer (DDFS) 140 is generating the LO signal, Figure 7, lines 60-61 of column 6).

Consider **claim 14**, Shi discloses a radio receiving method comprising: using a first front-end down-conversion mixer to down-convert an RF signal from a first low noise amplifier into respective intermediate frequency I and Q signals (read as LNA 102 outputs signals to mixers 104 and 106, Figure 7, line 53 of column 6).

Consider **claim 15, as applied to claim 14 above**, Shi discloses wherein a gain stage and a filtering stage are used to partially reject out-of-band signals and to block noise from propagating into a following stage (read as LPFs 114 and 116, and PGAs 124 and 126, Figure 7, lines 54 –57 of column 6).

Consider **claim 16, as applied to claim 14 above**, Shi discloses wherein a second down-conversion mixer converts a low IF signal into a base-band signal (read as mixing modules 142 and 144, Figure 7, line 60 of column 6).

Consider **claim 17, as applied to claim 14 above**, Shi discloses wherein a gain stage is used to block noise from being input into a following stage (read as PGAs 124 and 126, Figure 7, lines 54 –57 of column 6).

Consider **claim 18, as applied to claim 14 above**, Shi discloses wherein a low-IF architecture is used to receive data (read as the receiver 100 in Figure 7).

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Consider **claim 19**, Shi discloses a radio receiving method comprising: using a first front-end down-conversion operation to obtain a desired signal that is centered at DC and where a DC-offset becomes a carrier leakage signal at a second LO frequency (read as receiver 100 comprising mixers 104, 106, 142 and 144, and DC offsets 118, 122, 132 and 134, Figure 7, lines 46-61 of column 6).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 4 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shi et al. (U.S. Patent 7,136,431 B2).

Consider **claim 4, as applied to claim 3 above**, Shi discloses the claimed invention above but fails to specifically disclose wherein the amount of image rejection is about 40 dB.

However, the Examiner takes Office Notice of the fact that in GSM standard, the required amount of image rejection is around 40dB.

Therefore, it would have been obvious for a person with ordinary skill in the art at the time invention was made to make sure the amount of image rejection is about 40 dB so the receiver can be used in GSM.

Consider **claim 21, as applied to claim 19 above**, Shi discloses the claimed invention above but fails to specifically disclose wherein harmonic of the second LO signal are designed with a spectral purity to achieve an acceptable signal-to-noise ratio (SNR).

However, one of the purposes of Shi's invention is to improve the SNR of the receiving signal comparing to the receiving signal in the VLIF in Figure 1.

Therefore, it would have been obvious for a person with ordinary skill in the art at the time the invention was made to have the DDFS 140 to supply LO signal with it's harmonic with a spectral purity to increase the SNR to a desired level.

Consider **claims 22 and 24, as applied to claim 21 above**, Shi discloses wherein a frequency sum of a first LO signal and the second LO signal is the same as the desired RF signal frequency from the antenna as in claim 22, and wherein the first LO signal is very high frequency close to the incoming carrier signal from the antenna and the second LO signal is close to DC and the overall receiver architecture becomes a low IF architecture as in claim 24 (read as Shi discloses all the claimed physical elements, Shi's invention is capable of performing the same as claimed).

Consider **claim 23, as applied to claim 21 above**, Shi discloses wherein a frequency of first LO signal is the same as a frequency of the second LO signal (read as Shi discloses all the claimed physical elements, Shi's invention is capable of performing the same as claimed).

Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shi et al. (U.S. Patent 7,136,431 B2) in view of Husted et al. (U.S. PGPub 20030012313 A1).

Consider **claims 9 and 10**, Shi discloses the claimed invention above and filters 146 and 148, Figure 7, but fails to specifically discloses wherein the filter is a notch filter and is used to eliminate a carrier leakage caused by static or dynamic DC-offset as in

claim 9 and wherein the notch filter includes at least one of an elliptic filter and a chebyschef-II type filter as in claim 10.

Nonetheless, in related art, Husted discloses a wireless receiver comprising low-pass filters 140-IP and 140-Q (two-pole elliptical filters) for filtering unwanted signal from the output of quadrature mixers 175-IP and 175-Q, Figure 1, paragraphs [0016]-[0018].

Therefore, it would have been obvious for a person with ordinary skill in the art at the time the invention was made to incorporate the teachings of Husted into the teachings of Shi for the purpose of effectively filtering out the unwanted signal.

Claims 13 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shi et al. (U.S. Patent 7,136,431 B2) in view of Kohno et al. (U.S. Patent 6,987,794 B1).

Consider **claims 13, as applied to claim 11 above**, Shi discloses the second LO signal are generated using a phase locked loop (PLL) circuit but fails to specifically discloses wherein the second LO signal is generated using a divided reference clock input with filtering to reject harmonic signals.

Nonetheless, in related art, Kohno discloses receiver comprising a LO signal generating method to a mixer, comprising clock generating 16 outputs a reference signal to program frequency divider 13, and the output of program frequency divider 13 if filtered by loop filter 14 before PLL 12 outputs a signal a mixer (mixer 4), Figure 1, line 61 of column 3 to line 21 of column 4, and lines 10-37 of column 8).

Therefore, it would have been obvious for a person with ordinary skill in the art at the time the invention was made to incorporate the teachings of Kohno into the teachings of Shi for the purpose of generating a LO signal at a desired frequency.

Consider **claim 20, as applied to claim 19 above**, Shi discloses the claimed invention above and filters 146 and 148, Figure 7, but fails to specifically disclose wherein the filter is a notch filter and is used to suppress the carrier leakage to an acceptable level.

Nonetheless, in related art, Husted discloses a wireless receiver comprising low-pass filters 140-IP and 140-Q (two-pole elliptical filters) for filtering unwanted signal from the output of quadrature mixers 175-IP and 175-Q, Figure 1, paragraphs [0016]-[0018].

Therefore, it would have been obvious for a person with ordinary skill in the art at the time the invention was made to incorporate the teachings of Husted into the teachings of Shi for the purpose of effectively filtering out the unwanted signal.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Husted, Paul et al.	US 20030012313 A1	In-band and out-of-band signal detection for automatic gain calibration systems
Lim; Lysander et al.	US 7092675 B2	Apparatus and methods for generating radio frequencies in communication circuitry using multiple control signals

Liu; Bin	US 6560449 B1	Image-rejection I/Q demodulators
Moloudi; Shervin et al.	US 6417737 B1	Adaptive radio transceiver with low noise amplification
Paulus; Tod et al.	US 7228109 B2	DC offset reduction in radio-frequency apparatus and associated methods
Woo; Richard K. T. et al.	US 6125135 A	System and method for demodulating global positioning system signals

9. Any response to this Office Action should be **faxed to** (571) 273-8300 **or mailed to:**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Hand-delivered responses should be brought to

Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junpeng Chen whose telephone number is (571) 270-1112. The examiner can normally be reached on Monday - Thursday, 8:00 a.m. - 5:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edan Orgad can be reached on 571-272-7884. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Junpeng Chen
J.C./jc

EDAN ORGAD
PRIMARY PATENT EXAMINER

Edan Orgad 6/21/07